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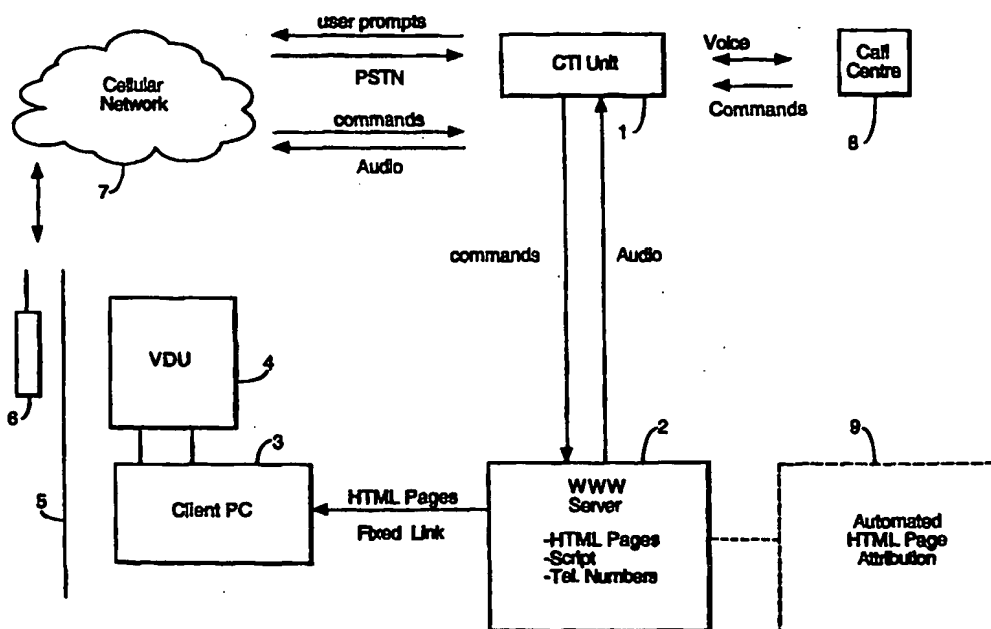
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(54) Title: INFORMATION SYSTEM

(57) Abstract

An interactive information delivery system server (2), delivering text or other visual data to a display unit (3) is accessed by a user by means of his own telephone (6), through an interface unit (1). The interface unit (1) interprets key pad presses and/or voice commands, and in response to these it controls the server (2). This allows the expensive and vulnerably hardware 3/4 (which may be a conventional PC and modem) to be positioned in a secure location, but still be usable by members of the public. As the location of the display unit (3) (which may be a conventional PC and modem) may make audio

output impractical, the interface unit (1) may pass an audio channel from the server (2) to the user's telephone (6). In response to appropriate commands from the telephone (6), it can also divert the call to a predefined call centre. The server (2) application scripts and control programs largely follow normal WWW Internet practice, except that the output from the server is to be transmitted to a destination (display unit 3) other than that from which the instructions arrive (the interface 2). The display unit (3), when in idle mode, displays a page or pages in the idle state, including a telephone number to dial in order to access information. This number will be specific to the display unit, allowing the interface unit (1) to identify which display unit the user wishes to use.



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INFORMATION SYSTEM

This invention relates to interactive computer information display systems for displaying text or other visual information. Such systems are coming into
5 widespread use, through information access systems such as the "Internet" World Wide Web (WWW). Large amounts of information are available to users having access to such systems. However, in order to gain access to such systems relatively expensive hardware is required, in particular a computer and a modem, limiting the availability of the information to users who have access to such a
10 terminal. Furthermore, the hardware is typically bulky, and is not easily portable. Mobile systems, comprising a "laptop" computer and a cellular telephone, do exist, but because of the limited bandwidth available on mobile communications, these tend to be very slow.

United States patents 5236199 (Thompson) and 4789895 (Mustafa)
15 describe systems in which narrowband telephone links are used to control images presented via a broadband system (e.g. a cable television downlink), but in both cases the telephone lines are fixed, and dedicated to a specific display unit. These systems therefore require the user to have the use of such a device. Because the links are necessarily fixed it is not possible to use such an arrangement for a
20 mobile user.

Multimedia "kiosks" have been proposed for locations to which the public have access. However, the equipment is valuable, and its accessibility to the public makes it vulnerable to theft, vandalism, and tampering. The equipment is also not suitable for exposed locations, as it is not in general weatherproof. In
25 order to identify the user, and allow payment to be made for the service, facilities such as a credit card "swipe" unit and/or personal identity number (PIN) facility are also necessary. The use of PINs is vulnerable to people reading a genuine user's keystrokes as he enters his PIN, in order to subsequently use the PIN himself.

According to a first aspect of the invention, there is provided an
30 interactive information delivery system comprising an information display unit, server means for transmitting text or other visual information from an information store over a delivery communications link to the information display unit, and a user interface for receiving control commands over a mobile communications link,

for identifying from the control commands the information display unit to be controlled by said commands, and for transmitting the control commands to the server means to select the information to be transmitted to the display unit.

According to a second aspect, there is provided a user interface for an
5 interactive information delivery system comprising means for receiving control commands over a mobile telecommunications link, and means for transmitting commands to an information server means, for controlling the server means to access text or other visual data from an information store and transmit said visual data over a delivery communications link, the delivery communications link being
10 selected according to said control commands received over the mobile telecommunications link.

According to a third aspect, there is provided a method of operating an interactive information delivery system comprising the steps of:

transmitting control information to a server over a mobile
15 telecommunications link;

controlling the server in response to said control information to select a delivery communications link;

controlling the server to select text or other visual information for transmission over the delivery communications link in response to said control
20 information;

transmitting said information from the server over the selected delivery communications link for display on a display unit.

The inputting and use of control information to select the delivery communications link allows the service to be provided to any user with a mobile
25 telephone who is within sight of the display unit, even though there is no direct physical connection or organisational association between them. The control command may be displayed on the display device when in idle mode, for inputting via the mobile telephone by the user when required. The human user completes the loop between the display of the appropriate prompt on the display device and the
30 inputting of the command on the mobile telephone, by way of his eyes, brain and fingers.

This arrangement has a number of advantages. In particular, this approach requires only standard computer hardware to display the information. As users

require no physical contact with the display unit, it can be positioned anywhere visible to potential users, without being exposed to the elements or the attentions of vandals, thieves, etc, for example a shop window.

In such a position it may be difficult to deliver an audio channel, as is
5 required by many multimedia services. To overcome this, the server means can be arranged to transmit audio information to the user by means of the mobile communications link.

Because only command information, and possibly an audio return channel, are transmitted over the mobile communications link, a narrow-bandwidth system
10 can be used for this link, without impairing the response speed of the system, which is limited only by the bandwidth of the delivery telecommunications link. The mobile communications link is preferably a dial-up connection made by the user, from the user's own cellular mobile telephone. This allows user identification and payment to be provided readily through the billing system, if required.
15 Furthermore, the need to use a cellular telephone would discourage frivolous customers. There is no need for access controls to prevent unauthorised use, other than those already provided by the mobile phone operator. In particular, if an access code (PIN) is required to identify the user, it is of no use to a "shoulder surfer" observing the user's keystrokes unless he has access to the user's
20 telephone itself.

In order to control the display and to "browse" the information, the user would use the telephone connection. After dialling a number indicated on the display unit when in idle mode (the number being specific to the display unit to be used), the user would move from page to page by either pressing the keypad as
25 instructed, either by information on the screen, or by simple voice commands. At key places in the display program, a command could allow the user to be connected to a further telecommunications link. This may be a telephone help desk, where for example, a customer's order may be taken. The help desk may have provision for itself transmitting commands to the server to display information on
30 the display device, allowing the help desk operator to control the session and display information likely to be of interest to the other user.

The display unit may be associated with a video input means, the system further comprising means for transmitting video signals from the video input means

to the further telecommunications line, for example to allow a videoconference to take place.

To reduce the user's call charges, the system could also be used to call back the user when a session is initiated, thereby transferring the cost of provision
5 to the information provider..

The display unit could be a PC and browser, controlled remotely by the user through the first and second communications links, either by voice commands or keystrokes. Costs could be further reduced by replacing the display unit by a Network Computer.

10 The invention can be used with either analogue or digital telephone systems (which term embraces Internet Protocol systems as well as conventional switched systems) as the mobile communications link, and with public switched telephone network (PSTN), Integrated Services Digital Network (ISDN), Private Circuit or Local Area Network (LAN) connections as the delivery communications
15 link (which will generally be fixed). Likewise, the relative physical locations of the display unit, user interface unit and server can also be varied.

The invention will now be described with reference to the drawings, in which:

Figure 1 is a block diagram illustrating the interrelationships between the
20 various functional elements which co-operate to form one embodiment of the invention.

Figure 2 is a block diagram illustrating an alternative configuration.

The systems of both Figures 1 and 2 comprise two network based sub-systems; firstly a computer telephony integration (CTI) unit 1 which acts as a user
25 interface, and secondly a WWW (World-wide web) Internet server 2. The interface unit 1 controls the WWW server 2. The server 2 is connected by a fixed link, e.g. PSTN, ISDN, LAN, etc, to a display unit 3, typically a standard PC and modem with standard WWW browser client software, and having a visual display unit (VDU) 4. In the arrangement shown in Figure 1, this link is direct, whilst in Figure
30 2 it is made by way of the user interface. The visual display unit 4 is located in a position where it can be seen by users, but protected from weather, vandals, theft, etc, for example behind a window 5. Users do not need physical access to the

display unit 3 or the VDU 4, as control of the display is carried out remotely, as will be described later.

A user having a mobile cellular telephone 6 can access information for display on the VDU 4 by dialling a telephone number specific to the display unit 3 and displayed on the VDU 4 when in idle mode. This enables connection to be made from the telephone 6, through a telephone network 7, to the interface unit 1, and thus to the server 2. The interface unit converts voice or keypad commands transmitted to it from the telephone 6 into instructions to the server to transmit the required data to the display unit 3. The function of a mobile telephone can be subsumed into a personal mobility terminal, making use of internet protocols. Mobile control access could then be made using a Mobile IP (internet protocol) session.

The interface unit 1 is also capable of connection to a call centre 8 to allow a voice link to be made between the telephone 6 and the call centre 8, for example for use as a help line, or in order to place a purchase order, to allow the user to be presented, by the call centre operator, with pages of interest etc.

As shown in Figure 2, both the display unit 3 and call centre 8 may be provided with video cameras, for generating images to be transmitted to each other by way of the interface unit 1.

The operation of the system will now be described.

The interface unit 1 answers telephone calls made to the number displayed on the VDU 4 when the client PC is in idle mode. The interface unit 1 then interprets the key pad presses and/or voice commands, and in response to these it identifies the display unit 3,4 to be controlled and commands the appropriate server 2 to initialise a session, and then to move from page to page.

The interface unit 1 can also pass an audio feed from the server 2 to the user's telephone 6, which may include speech prompts to support visual prompts displayed on the VDU 4. In response to appropriate commands from the telephone 6, it can also divert the call to a predefined call centre.

At the end of the session, the interface unit 1 clears the call and commands the WWW server to reset to idle. It also logs any charges incurred for use of the system, for billing either to the user's telephone account, or to a separate account previously identified during the initialisation process.

In a variant of this embodiment, the interface unit 1 also stores customer information, e.g. account details and telephone numbers. On answering a call, the interface unit checks the customer's identity, using calling line identity (CLI) signals generated by the telephone network on call set-up, and if the customer is
5 identified as having an account, the interface unit 1 immediately clears the call and dials back to the user's telephone 6, using the calling line identity. This reduces call charges to the user.

The Internet WWW server 2 has associated CGI (Common Gateway Interface) scripts and control programs. The CGI script generates user-specific
10 interactive content, such as page counters and password systems, if required. The CGI script and control programs largely follow normal WWW Internet practice except that the output from the server is to be transmitted to a destination (display unit 3) other than that from which the instructions arrive (the interface 2).

Future realisations could include a distributed approach using "Object
15 Broker" technology, in which the application makes use of a distributed architecture. The application scripts provide a static page, or a set of "rolling" pages, specific to the display unit 3 when idle using "Server Push" technique. On command from the interface unit 1 the server 2 handles the communications session to the display unit 3 and transmits the required pages to the display unit 3
20 as determined by an application script program. It also transmits any audio signals to the interface unit 1. In one form, the server 2 may be arranged to transmit the same data, including both audio and visual, to both the interface unit 1 and the display unit 3, the interface unit being arranged to select the audio signal for onward transmission to the user's telephone 6 also. In this arrangement the display
25 unit 3 receives the audio channel as well as the visual information, but because of its position behind a window 5 this may not be audible to the user. Indeed, the display unit 3 need not be fitted with an audio output.

In another arrangement, shown in Figure 2, the server 2 transmits the visual information (as well as any audio signal) to the interface unit 1, which itself
30 transmits the visual information to the display unit 3. This removes the need to modify the server 2 to transmit information to a destination other than that from which its control instructions come. This arrangement is functionally equivalent to the arrangement of Figure 1, the interface 1 merely relaying the visual information

from the server 2 to the display unit 3. The server 2 reverts to the idle state when commanded by the interface unit 1.

A basic realisation of the server 2 would use individually composed HTML pages in the server, with the prompts inserted during manual creation. In an enhanced system an extra sub-system 9 would interpret standard WWW pages and automatically produce the necessary screen prompts to guide the user through the data system. Alternatively, as shown in Figure 1, HTML commands for controlling the display may be transmitted from the call centre 8 to the interface unit 1.

10 As shown in Figure 2, the display unit 3 may be associated with a video camera 10, for transmitting video images to the interface unit 1 (either using an Internet Protocol application or as an ISDN application), and hence to the call centre 8 or to another user. Video images may also be transmitted in the reverse direction, from a camera 11, for display on the display device, thereby allowing a video conference to take place. It will be apparent that both these optional features may be used, singly or in combination, in either embodiment.

The display unit 3, which is a conventional PC and modem, when in idle mode displays a page or pages in the idle state, including a telephone number to dial in order to access information. This number will be specific to the display unit, 20 allowing the interface unit 1 to identify which display unit the user wishes to use. Alternatively, information about the location of the user may be extracted from the cellular radio system, or by using calling line identity if the call is from a fixed telephone, in order to identify the whereabouts of the user and therefore which display unit he is viewing.

25 The display unit 3 receives new pages transmitted from the WWW server 2, and is also capable of rebooting into the WWW browser application and re-establishing communications to the server 2 if a problem occurs (e.g. power failure)

Each display system 3/4 that is deployed would have a unique application script (set of instructions) in the server 2, which associates an HTML page with 30 the key/voice commands required to go to other pages or to the call centre 8. The telephone numbers by which to contact the interface unit 1 (which is specific to the display unit 3) and the call centre 8 would also appear in the script.

CLAIMS

1. An interactive information delivery system comprising an information display unit, server means for transmitting text or other visual information from an information store over a delivery communications link to the information display unit, and a user interface having means for receiving control commands over a mobile communications link, means for identifying from the control commands the information display unit to be controlled by said commands, and means for transmitting the control commands to the server means to select the information to be transmitted to the display unit.
2. An interactive information delivery system according to claim 1, wherein the server means is arranged to transmit audio information to a user by means of the mobile communications link.
3. An interactive information delivery system according to claim 2, wherein the user interface includes means for setting up a telephone connection between the user interface and a further telecommunications line.
4. An interactive information delivery system according to claim 3, wherein the further telecommunications line is arranged to transmit commands to the information server.
5. An interactive information delivery system according to claim 3 or 4, wherein the display unit is associated with a video input means, the system further comprising means for transmitting video signals from the video input means to the further telecommunications line.

6. A user interface for an interactive information delivery system comprising means for receiving control commands over a mobile telecommunications link, and means for transmitting commands to an information server means, for controlling the server means to access text or other visual data from an information store and
5 transmit said visual data over a delivery communications link, the delivery communications link being selected according to said control commands received over the mobile telecommunications link.

7. A user interface according to claim 6, having means for receiving audio
10 data from a server means, and means for transmitting said audio data over the mobile telecommunications link.

8. A user interface according to claim 5, 6, or 7, further comprising means for setting up a connection between the user interface and a further
15 telecommunications line.

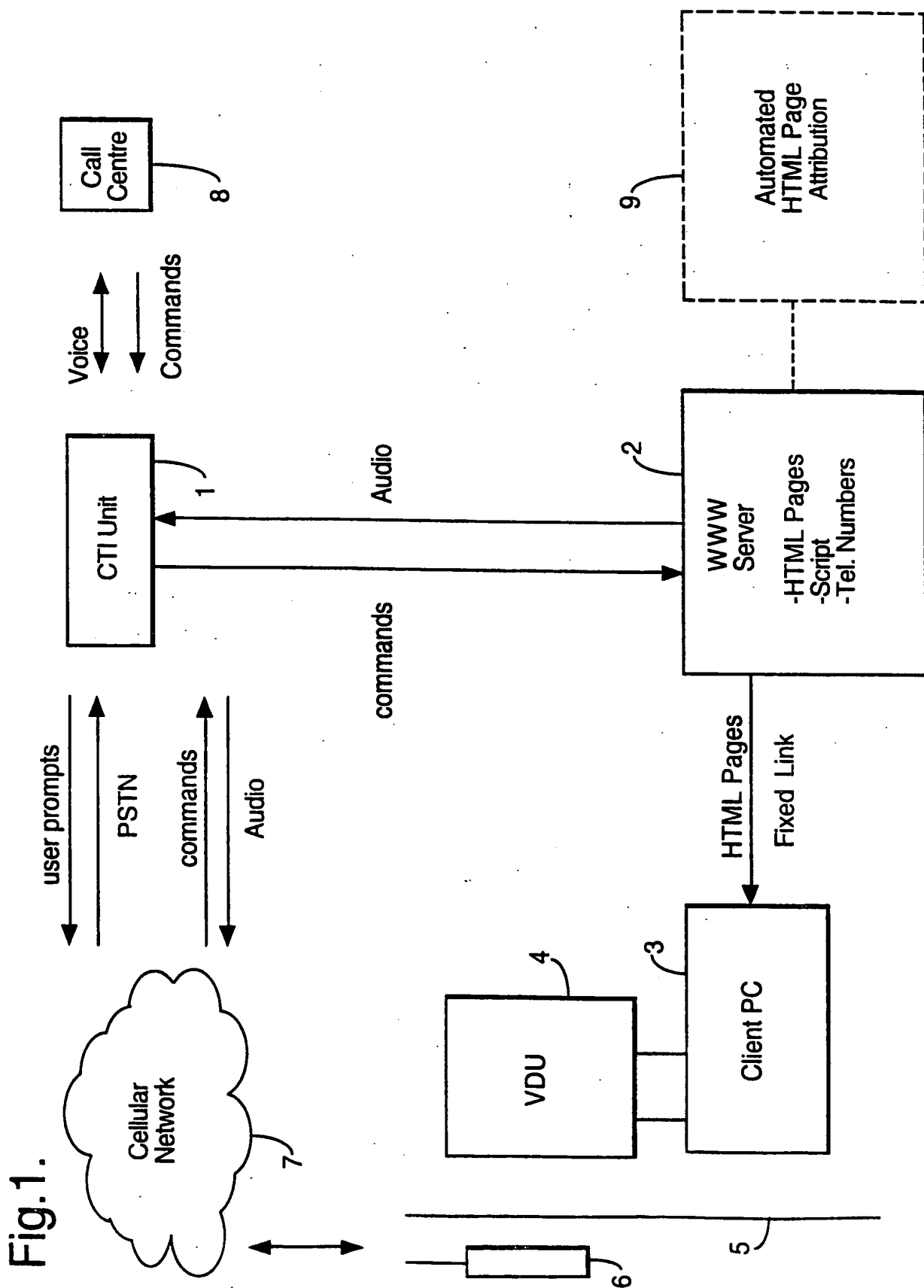
9. A user interface according to claim 8, having means for receiving visual data from the information server means over the delivery telecommunications link and transmitting said visual data over the further telecommunications line.
20

10. A user interface according to claim 8 or 9, wherein the further telecommunications line is connected to means for transmitting commands to the information server.
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11. A method of operating an interactive information delivery system comprising the steps of:
- transmitting control information to a server over a mobile telecommunications link;
 - 5 controlling the server in response to said control information to select a delivery communications link;
 - controlling the server to select text or other visual information for transmission over the delivery communications link in response to said control information;
 - 10 transmitting said information from the server over the selected delivery communications link for display on a display unit.
12. A method according to claim 11, wherein audio information is transmitted from the server to a user by means of the mobile communications link.
- 15 13. A method according to claim 11 or 12, further comprising the step of controlling the server to set up a connection between the user and a further telecommunications line.
- 20 14. A method according to claim 13, wherein visual data is transmitted from the information server means over the delivery telecommunications link to the further telecommunications line.
- 25 15. A method according to claim 13 or 14, wherein the further telecommunications line is connected to means for transmitting commands to the information server.
- 30 16. An interactive information delivery system substantially as described with reference to the drawings.
17. A method of operating an interactive information delivery system substantially as described with reference to the drawings



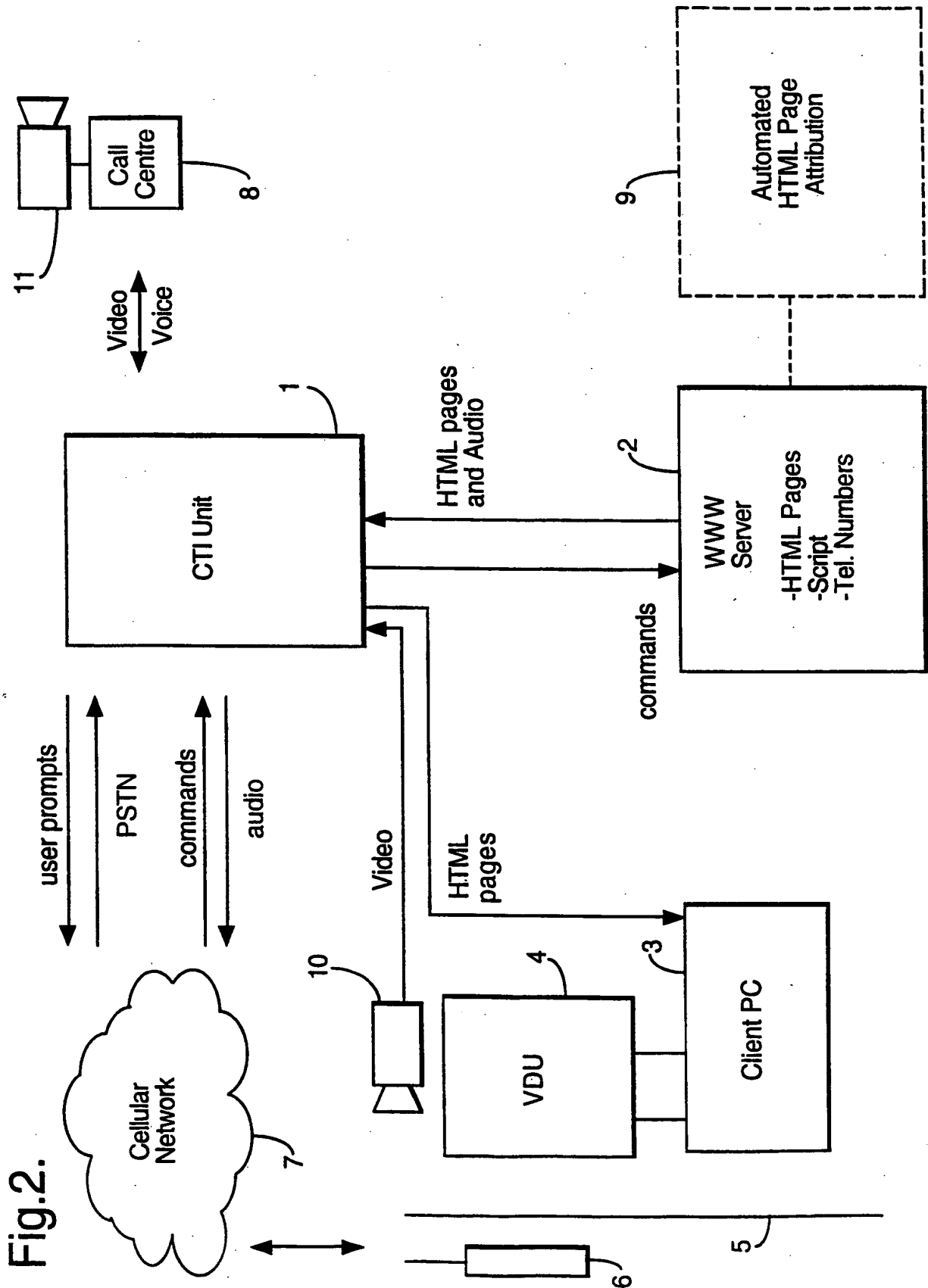


Fig.2.

INTERNATIONAL SEARCH REPORT

International Application No.

PCT/GB 98/00340

A. CLASSIFICATION OF SUBJECT MATTER

IPC 6 H04M11/08 H04L29/06 H04M3/00 H04N7/173 H04M3/50
H04Q7/22

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 H04M H04L H04N H04Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

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C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|----------|---|------------------------------------|
| X A | WO 92 14329 A (TELENOKIA OY) 20 August 1992 see page 3, line 19 - page 4, line 2 see page 8, line 24 - page 9, line 13; figure 4 see page 10, line 18 - page 11, line 10; figures 6,7 | 6,8,9,11 1-5,7, 10,12-17 |
| X | US 4 965 821 A (BISHOP RONALD D ET AL) 23 October 1990 see column 3, line 21-43 see column 5, line 26 - column 6, line 23 see column 7, line 46 - column 8, line 56 see column 9, line 49 - column 11, line 45 --- -/-- | 1,2 |

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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Date of the actual completion of the international search

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INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 98/00340

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

| Category | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|----------|---|-----------------------|
| X | DE 43 42 776 A (SIEMENS AG) 22 June 1995 see column 2, line 61 - column 3, line 43 see column 4, line 6-11 see column 5, line 7-46; figures 1,2 ---- | 1 |
| A | EP 0 710 017 A (PLESSEY SEMICONDUCTORS LTD) 1 May 1996 see column 2, line 19 - column 3, line 54 ---- | 1,6,11 |
| A | KYLANPAA M,PIHLAJAMAA O AND BERGENWALL M: "Nomadic Access to Information Services by a GSM Phone" COMPUTERS & GRAPHICS, vol. 20, no. 5, 1 September 1996, pages 651-658, XP002037372 see paragraph 2 - paragraph 4.1; figures 1,2 ---- | 1 |
| A | "INTEGRATED WEB AND TELEPHONE SERVICE CREATION" BELL LABS TECHNICAL JOURNAL, XP002036350 see page 20, right-hand column, line 39 - page 21, right-hand column, line 11; figure 1 see page 28, left-hand column, line 11 - page 30, right-hand column, line 22; figure 8 see page 33, left-hand column, line 3-36 ----- | 1 |

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/GB 98/00340

| Patent document cited in search report | Publication date | Patent family member(s) | Publication date |
|---|---------------------|---|--|
| WO 9214329 A | 20-08-92 | FI 910682 A AT 138769 T AU 663482 B AU 1190892 A DE 69211147 D DE 69211147 T EP 0609209 A US 5351235 A | 13-08-92 15-06-96 12-10-95 07-09-92 04-07-96 23-01-97 10-08-94 27-09-94 |
| US 4965821 A | 23-10-90 | NONE | |
| DE 4342776 A | 12-06-95 | NONE | |
| EP 0710017 A | 01-05-96 | GB 2294563 A JP 8228317 A | 01-05-96 03-09-96 |

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